This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

DEPARTMENT OF HEALTH

OF THE

CITY OF NEW YORK

State Doc

DEPARTMENT OF HEALTH

OF THE

CITY OF NEW YORK

NO. 1 TUBERCULOSIS MONOGRAPHS JUNE, 1916

A STUDY ON FOOD

WITH SPECIAL REFERENCE TO

THE FOOD VALUE OF THE DIETARY AT THE NEW YORK CITY MUNICIPAL SANATORIUM

BY

ROBERT J. WILSON, M.D.
DIRECTOR OF THE BUREAU OF HOSPITALS, DEPARTMENT OF HEALTH

AND

WALTER L. RATHBUN, M.D.
PHYSICIAN-IN-CHARGE, NEW YORK CITY MUNICIPAL SANATORIUM

Public health is purchasable. Within natural limitations a community can determine its own death rate

C

HARVARD COLLEGE
AUG 8 1916
LIBRARY

COPYRIGHT, 1916
BY THE
AMERICAN MEDICAL ASSOCIATION

A STUDY ON FOOD

WITH SPECIAL REFERENCE TO

THE FOOD VALUE OF THE DIETARY AT THE NEW YORK CITY MUNICIPAL SANATORIUM

ROBERT J. WILSON, M.D.
Director of the Bureau of Hospitals, Department of Health

AND

WALTER L. RATHBUN, M.D.
Physician-in-Charge, New York City Municipal Sanatorium

NEW YORK

The dietary question is fraught with many difficulties in an institution for the treatment of tuberculosis, and is a problem which is never entirely solved. Just when the responsible party is congratulating himself on a satisfactory, as well as an economical solution of the proposition, trouble appears from the most unexpected sources, varying from a bug in the cereal to a jump in the cost per capita. During recent years the consensus of opinion has changed from superalimentation in tuberculosis to the more rational procedure of feeding three generous meals a day, with extra diets only when indicated by poor appetite at the meal periods, accompanied by a markedly substandard or steady loss of weight. Some patients with poor appetites will eat as much as usual during meal periods, even if given extra between-meal diets, and when the nourishment is required and well borne, its administration is indicated. However, if the total caloric intake is not increased, the extra diets should be discontinued.

It has been pointed out by competent observers, notably by King and Bardswell and Chapman, that the strain of forced feeding on the organs of assimilation and elimination is so great that it becomes a source of danger rather than benefit in many cases, and its use should be the exception rather than the rule. While this is generally true, we have observed many patients who were capable of assimilating enormous quantities of nourishment without any apparent primary or secondary deleterious effects on their organisms. We

believe, however, that conservatism should play a large part in the feeding of the tuberculous, and as the disease generally persists for a long period, the gastro-intestinal tract and kidneys should be spared all extra strain, if they are to be expected to continue a successful struggle after the first acute onset of the disease has been overcome. The patient who emerges from the preliminary fighting with a damaged gastro-intestinal tract is in an unfortunate position, with poor prospects of becoming a comfort to himself or a permanently self-sustaining member of the community. His chances for an early exacerbation are excellent, and for final recovery, to say the least, are compromised. It seems only rational that the stomach should have a maximum amount of rest after a heavy meal, and for this reason alone the routine administration of milk and egg diets between meals would seem to be strongly contraindicated. In this connection, we should like to mention Dr. E. S. McSweeney's interesting studies at Otisville in 1908, for they are very convincing, and established the point just made as applied to patients in the Municipal Sanatorium. At that time reports from other institutions[1] indicated a number of objections to forced feeding, but it was felt that possibly some of these reasons did not necessarily apply at Otisville, where all afebrile patients are compelled to do a certain amount of work.

McSweeny's experiment was as follows:

Two groups of patients were selected. Group 1 was allowed milk and eggs in addition to the three meals, while Group 2 received only three regular meals daily. It was found that the patients in Group 2 (those who ate only three regular meals) averaged larger weight increases than those in Group 1. It was decided to discontinue the milk and egg diets that had been administered as a routine morning and afternoon since the institution was opened, and to depend on the regular meals in all but exceptional cases. This policy was proved, by later experience, to be sound, and has been continued to date.

A study of the caloric content of our dietary was carried out at the Women's Unit in 1910, but the results were not published. The work was resumed two years ago and, owing to the paucity in the literature of studies in connection with the dietaries of

1. Newton, R. C.: The Diet and Régime in Vogue in Thirty-Four Tuberculosis Sanatoria, Proc. Sixth Internat. Cong., Part 2.

tuberculosis institutions, it was decided to publish our results with the hope that such a step would promote discussion and criticism along this line. It was felt that so important a function as the dietary, which is one of the fundamentals of sanatorium treatment, deserves more comprehensive and collective study than it has received in the past, and that an exchange of ideas by the various workers in tuberculosis institutions is particularly desirable, for such an exchange will not only tend to lead to economy in administration, but will eventually provide a scientific basis on which to construct the future dietaries. Dettweiler said, "My kitchen is my pharmacy," and Osler[2] is quoted as follows: "As a healing of tuberculous process is largely dependent upon the state of nutrition, the question of diet becomes of the very first importance."

In spite of the fact that the dietary has been recognized for many years to be of prime importance, one finds but few studies, by men in this country, of a character that deserve more than passing attention. It seems deplorable that so little effort has been expended in this field during the past eight or ten years while the tremendous activities in connection with other phases of the tuberculosis problem have been in progress. Nothing tends to conserve the provision supply to such an extent as an active interest in the actual amount by weight of food consumption and food waste.

The aim of those in control of institutional dietaries should be: (1) to supply the food needs of the patients as economically as is consistent with the quantity, quality and service required for the treatment of the disease from which the patients suffer; (2) to avoid too frequent repetition of any particular foodstuff, and (3) to keep a close check on the amount of plate, general table, kitchen and ice box waste. When our dietary studies were resumed in 1914, we were guided by these principles.

The most costly item of the dietary is meat, and this was our first point of attack. It was found that egg breakfasts were entirely satisfactory to the patients; therefore eggs were served in various styles for from four to five of the morning meals each week. Steak and chop breakfasts were entirely eliminated, and other meat orders were gradually cut down to the minimum.

2. Friedenwald and Ruhräh: Diet in Health and Disease.

The per capita per diem consumption of meats and fish fell from an average of 19.9 to 14.5 ounces during the course of six months. The eggs which are used for cooking purposes at the Municipal Sanatorium are of cold storage variety (fresh gathered extra), and are contracted for (1915) at from 25.5 to 26 cents per dozen. These are recandled after delivery to the institution. The substitutions above referred to and the routine serving of small initial meat orders, which cuts down the plate waste of those who have small appetites, but who, on general principles, take a large slice of meat when it is immediately available, accomplished the reduction in meat consumption and was mainly responsible for lowering our cost per capita for foods from 42 cents for the first nine months of 1913 to 37 + cents for the same period in 1914

TABLE 1.—SAVINGS FOLLOWING SUBSTITUTION OF EGGS FOR MEATS AT BREAKFASTS COVERING A PERIOD OF FOUR WEEKS

No. of Meals	Variety of Food	Per Meal	Total	Price, cts. (1914)	Cost
8	Steak	260 lbs.	2,080 lbs.	20 per lb.	$416.00
8	Chops, loin	145 lbs.	1,160 lbs.	19.3 per lb.	223.88
	Chops, rib	125 lbs.	1,000 lbs.	10 per lb.	100.00
Total for meat					$739.88
16	Eggs	80 doz.	1,280 doz.	23.6 per doz.	302.08
Total savings for period of four weeks					$437.80

(Table 1). Care was taken to keep the average number of calories up to a reasonable standard, and that this was satisfactorily accomplished is indicated by the fact that our patient weight reports continued to be entirely satisfactory.

We have felt for several years that it is not only entirely unnecessary, but also undesirable to serve meat and eggs at every meal; in fact, in 1910 meat and eggs were eliminated from the breakfasts at the women's unit for several weeks. During this time the weight increases and general physical condition of the patients were entirely satisfactory. In September, 1915, after an explanatory talk with the patients at the women's unit, it was decided to substitute 8 ounces of milk per capita for eggs on four mornings in the week, and this has not only proved to be a satisfactory change, but has, in addition, resulted in a weekly saving of 11.3 cents per patient per week.

Table 2 demonstrates that by substituting milk for eggs it is possible to save $16.41 a day in an institution of 580 beds (the capacity of the Municipal Sanatorium) without changing the caloric value of the dietary. If this substitution was made on four mornings each week, the annual saving would be approximately $3,500. Another factor of importance in connection with the substitution of milk is that good milk is easily procurable (at least in this vicinity) at 5.5 cents a quart at all seasons, while satisfactory eggs are very often unobtainable, in sufficient quantities, at any price. A further result was an increased consumption of cereal, which we feel is particularly desirable and which has practically no effect on the cost

TABLE 2.—COMPARATIVE FOOD VALUE AND COST OF MILK AND EGGS

		Protein	Fat	Carbohydrate	Total Calories	Cost per Capita per Diem
Eggs, 2 per portion	Grams...	13.50	10.54	.....	...	(Eggs 26 cts. per dozen) 4.33 cts.
	Calories..	55.31	105.46	.....	161	
Milk, ½ pt. per portion	Grams...	7.48	9.08	11.34	...	(Milk at 6 cts. per qt.) 1.5 cts.
	Calories..	30.66	84.44	46.49	162	

Saving per capita per diem, when milk is substituted, 2.83 cents.

TABLE 3.—COMPARISON OF CARVING WASTE AT MALE AND FEMALE UNITS, NOV. 1 to 7, 1915

Variety	Male Unit		Female Unit	
	Amount Received from Storehouse, Pounds	Carving Waste, Pounds	Amount Received from Storehouse, Pounds	Carving Waste, Pounds
Roast beef.....	167	14	96¾	1½
Corned beef.....	203	44½	95	12½
Roast lamb.....	182	19	94½	5
Pot roast.....	164½	27	99½	2½
Boiled ham.....	138½	33½	63	13

per capita. The breakfast menu on the four days referred to consists of milk, 16 ounces; a good variety of hot cereal and rolls; butter; coffee, and occasionally fruit.

A factor worthy of mention in connection with the utilization of our meats, which applies more especially to the women's unit, is the large children census. We have seventy-two children, between the ages of 5 and 14 years, and all of the meat which cannot be served to adults in the form of slices is cut up into small pieces and served to our juveniles. Table 3 represents

the amount of carving waste which is eliminated by this procedure, and demonstrates to some extent the advantage, from the standpoint of economy, of treating small children in institutions with adults.

Much of the roast meat which is close to the bone and which is of fine quality is available for this use. The utilization of "left overs," which are bound to be ever with those who serve large numbers of persons, is a hard problem to handle in a state, county or municipal tuberculosis institution, where the stay is for a comparatively long period and where those who are catered to are posessed of their normal amount of gray matter, in addition to a highly specialized sense of their rights as citizens and former tax payers. Many economical and delectable dishes of high food value which are prepared from "left overs" and which are eaten with relish in most well to do households are scouted by a large majority of the patients. Those culinary connoisseurs have very definite ideas on the subject of dietetics, and as their forcefully expressed likes and dislikes are the governing factors in the formation of the institutional menu, it behooves the food purveyor to watch that infallible barometer, the garbage can, with ever increasing interest, and to catch the rumblings of any approaching storm from the distance. This precaution often saves the situation before any real serious developments occur, and, besides, keeps the responsible party in a continual state of preparedness. In our experience, hash has always been mistrusted in spite of the excellence of its ingredients, and it became necessary for us to discontinue it over two years ago, after our unsuccessful efforts to please with various "hashy" combinations had been paraded before the Board of Estimate through the agency of a former patient. The patients gave abundant evidences that they would not eat it, and although the "hash meal" was an economy, it was felt that it did little to further the results of treatment, so it was stricken from the menu. It is easy to carry economy too far in the planning of an institutional dietary. It is also necessary to bear in mind the fact that the physical well being of the patients is of first importance, and that no one thing tends to cause more dissatisfaction among the patients than an unsatisfactory menu.

The most reliable criterion for checking up the adequacy and esthetic qualities of the dietary is a computation of the actual food consumption and its value in calories, combined with a careful per capita study

TABLE 4.—PER CAPITA CONSUMPTION OF FOODS AT BOTH UNITS AMONG THE VARIOUS CLASSES OF PATIENTS

	Adults				Children					
	Men	%	Women	%	Boys 9-15 Yrs.	%	Girls 5-9 Yrs.	%	Girls 10-14 Yrs.	%
Protein (grams)	127.2	..	107.4	..	105.5	..	84.9	..	91.9	....
Fat (grams)	154.5	..	121.8	..	129	..	99.3	..	102.3	....
Carbohydrates (grams)	425.7	..	288.9	..	413.88	..	254.4	..	267	....
Protein (calories)	521	14	440	16	432	13	348	15	376	15.5
Fat (calories)	1,436	39	1,132	41	1,199	36	923	40	951	39.5
Carbohydrates (calories)	1,745	47	1,184	43	1,696	51	1,043	45	1,094	45
Average calories per diem	3,700+	..	2,750+	..	3,300+	..	2,300+	..	2,400+	....
Average number calories per pound of body weight	27	..	23	..	43.5	..	33.8	..	34.5	....

Calories for male and female adults combined, 3,200.

of the plate waste. If the number of calories is up to the standard, the food waste low and there has been a dearth of justifiable complaints, the person or persons responsible for the dietary can rest assured that all is well.

Table 4 presents one of our dietary studies. In Table 5 are given King's and Bardswell and Chapman's diets. It will be seen that our protein content is considerably lower than Bardswell and Chapman's, and slightly lower than King's; the fats are lower than Bardswell and Chapman's, and higher than King's, and the corbohydrates about equal to King's, while much higher than Bardswell and Chapman's. Our dietary, however, is giving excellent satisfaction with a minimum of gastro-intestinal disturbances, and the comparative results tend to show that no trouble may be expected so long as the protein, fat and carbohydrate content of a dietary is kept within certain bounds.

TABLE 5.—KING'S AND BARDSWELL AND CHAPMAN'S DIETS

	King's Standard Diet Annex,* Grams	Bardswell and Chapman's Standard Diet,† Grams
Protein	131	144
Fats	113	160
Carbohydrates	385	270
Calories	3,166	3,186

* King: The Construction of an Economic and Efficient Diet in Tuberculosis. Tr. Nat. Assn. S. and P. Tuberc., 1909.

† Bardswell, N. D., and Chapman, J. E.: Diets in Tuberculosis. New York, Oxford University Press, 1908.

It has been stated that children require 80 calories per kilogram (36 calories per pound) of body weight, and adults, moderately active, from 35 to 40 calories per kilogram (16 to 18 + calories per pound) of body weight.[3]

Rubner's figures for a man of 65 kg. (140 pounds) are given in Table 6.

Our average for men, 26 calories per pound of body weight, is well above the figures given for men at hard work, and the average for women about equal to it. The male children consume far above the average calories per pound as given by Pattee, and the female children slightly less than her figures. It would seem

3. Pattee, Alida Frances: Practical Dietetics with Reference to Diet in Disease, Mount Vernon, N. Y., A. F. Pattee, 1910.

as if from 3,100 to 3,200 calories is about the normal average for the mixed sexes in tuberculosis institutions, as our food consumption was controlled entirely by the appetites of the various patients, and I presume that such was the case in the other institutions mentioned above.

If this premise is true, then the ability of the various patient groups to select the amount and variety of food necessary to yield what is considered to be the proper number of calories from entirely different dietaries is remarkable, and confirms the experiences of other observers in this field. In contrast to these figures, the reader may be interested to learn that Fisher gives 300 calories as a hypothetic figure for the amount of protein needed in the diet of the tuberculous or, as he

TABLE 6.—RUBNER'S FIGURES FOR A MAN OF 140 POUNDS

	Total Calories	Calories per Kg. of Body Weight	Calories per Lb. of Body Weight
During rest in bed	1,800	28	13
In repose	2,100	32	14½
Light work	2,300	33	15
Moderate work	2,600	40	18+
Hard work	3,100	48	22

states, 50 per cent. more than is required for a healthy man. In answers to a questionnaire which he sent to fourteen tuberculosis institutions in this country and abroad, it was found that the number of calories furnished by the various dietaries varied from 410 to 1,200 for protein, from 750 to 2,200 for fat, and from 560 to 2,100 for carbohydrates. In thirteen institutions the number of calories of protein exceeded 500, in thirteen the number of calories of carbohydrates exceeded 1,100, and in twelve the fats ranged from 1,100 calories up. The calories varied from 2,400 to 5,500 in all, ten institutions averaging 3,500 calories and up.[4]

CALORIES PER POUND OF BODY WEIGHT

As might be expected, the number of calories consumed per pound of body weight was found to be much greater in children than in adults, but we were surprised by the marked excess of calories consumed by the group of male children between the ages of 9 and 14 years over the female group of the same ages,

4. Fisher, Irving: Proc. Sixth Internat. Cong. Tuberc., i, Part 2.

which amounted to 10 calories per pound of body weight. The average gain in weight, however, was 1¼ pound for the female group and $^{73}/_{100}$ for the male group. This may be accounted for by the greater activity of the boys, although one would think that the excess of calories consumed by them should be sufficient to neutralize the effect of this activity to some extent. A study of the weight records of the male and female units covering four years is of interest in connection with the foregoing. These units are separate institutions so far as the records are concerned, and our opportunity for watching the weight increments of the two sexes is peculiarly favorable. It will be seen that our records prove conclusively that the capacity for accumulating weight is markedly in favor of the females in spite of the monthly menstrual drain, and is enough to lead us to believe that it is a characteristic of the female sex. I believe it is the general opinion that males gain more on the average than females, and our studies have shown that the consumption of calories per pound of body weight by males is in excess of that of the female sex: 27 calories per pound for men and 24 for women. In spite of the greater tissue bulk in males with the capacity for greater food consumption, our results prove that females gain the most weight.

REPETITION OF FOODSTUFFS

Care in the avoidance of repetition has been the saving grace of many splendid culinary combinations. No matter how infatuated patients may be with a certain foodstuff, if it is served too frequently their ardor will soon wane, and a good thing is lost to the menu. Much of the monotony of the institutional dietary is due to repetition, and the fact that the menu is not so varied as to prevent patients from making a fair guess as to what they will receive at a certain meal on a certain day. With this in mind, about two years ago, we constructed a four weeks' menu which covered all of the foodstuffs available on our yearly contract. During the late spring, summer and early fall months, we have an abundance of green vegetables from our garden, and these are added to our menu as they are produced. We have from one to two vegetables besides potatoes for dinner and supper. For the first four weeks of operation the menu starts with the first week and ends with the fourth; for the second four weeks it commences with the second and ends

with the first week; for the third four weeks, it begins with the third week and ends with the second, etc. This arrangement makes it practically impossible for any patient to surmise what food is to be served at any time. Moreover, the plan facilitates the ordering of supplies, and enables one to work out a daily ration with very little difficulty.

Our experience has taught us that it is good judgment to stop for a while, at least, any particular combination that the patients begin to tire of. A good illustration of the evil of repetition is our experience with codfish balls at the men's unit several years ago, where it had been customary to serve them about four times

TABLE 7.—WEIGHT

	Average Increase of Those Gaining, Pounds	Gained		Lost	
		Number	Per Cent.	Number	Per Cent.
1912: Male unit	7.15	419	80.11	104	19.89
Female unit	12.23	276	91.39	26	8.61
1913: Male unit (adults)	9.84	357	83.02	73	16.98
Male unit (children)	5.21	48	97.96	1	2.04
Female unit (adults)	13.48	228	87.36	33	12.64
Female unit (children)	10.03	106	96.36	4	3.64
1914: Male unit (adults)	9.46	305	78.41	84	21.59
Male unit (children)	7.20	39	97.50	1	2.50
Female unit (adults)	10.71	200	83.68	39	16.32
Female unit (children)	10.25	104	96.30	4	3.70
1915: Male unit (adults)	10.62	350	85.37	60	14.63
Male unit (children)	9.48	36	97.30	1	2.70
Female unit (adults)	11.69	232	85.29	40	14.70
Female unit (children)	11.49	70	97.22	2	2.78

each month. It is a cheap meal, and was appreciated by the patients for a time; but they finally developed a marked aversion to salt cod, and on one occasion a few outraged "citizens" waylaid a whole meal of carefully prepared uncooked codfish balls and threw them into the refuse pail. The miscreants were apprehended and punished, but nevertheless the hint was taken and salt codfish did not appear on our menu again for a considerable period. It is now alternated with other salt fish and is appreciated.

PLATE WASTE

The work reported by Wright on plate waste is of value to those employed in insane hospitals, but of practically no use to workers in tuberculosis institutions. It is to be expected that the per capita waste will be greater in a tuberculosis institution than in an institution for the care of insane or in an acute hos-

pital, owing to the fact that much larger quantities of food, a great deal of which is especially rich in wastage, is served to the tuberculous. Meats furnish an especially large amount of waste, owing to the comparatively large percentage of uneatable portions, such as gristle, fibers, small bones, etc., and this food forms a conspicuous part of the dietary of the sanatorium. We have no means of checking up our waste with that of other institutions for the treatment of tuberculosis, as our review of the literature has failed to reveal any studies on this problem. We feel that periodic studies of the per capita food wastage will do much to stimulate those in charge of the dietary to further efforts toward economy, and are sure that the result of food waste studies by the various large sana-

TABLE 8.—AVERAGE PERCENTAGE OF MEAT CONSUMPTION AND SHRINKAGE

Meat	Consumption, Per Cent.	Shrinkage and Wastage, Per Cent.
Roast beef	36 to 39	64 to 61
Pot roast	28+	71+
Beef steak, sirloin	25.5	74.5
Roast lamb	29.5	70.5
Lamb chops	31	69
Liver	44.5	55.5
Roast chicken	26	74
Bacon, fried	30.5	69.5
Salt pork	54	46

toriums would be of great service to all. Our dietitians are instructed to serve as much of any particular food as a patient desires to eat; but to reduce useless waste to a minimum by serving it in small portions. This rule has proved to be satisfactory to the patients, and is bound to effect economy of foodstuffs.

Our average per capita per diem waste of solid foods is for male adults, $^{45}/_{100}$ pound; for boys from 9 to 15, $^{27}/_{100}$ pound; for females, entire dining hall, $^{41}/_{100}$ pound, and for female children, $^{335}/_{1000}$ pound. It is noticeable from this that children "clean their plates" much better than adults, although the smaller amounts served accounts for a part of this.

In connection with our plate waste studies we carried on investigations covering the shrinkage in meats, which were followed up from the time the meat was cut from the side of the carcass until the remnants were accounted for as plate waste.

The following headings used in our tables illustrate the method of procedure:

Date.
Varieties of meat.
Amount received from storehouse, including butchering waste, pounds.
Kitchen trimmings, pounds.
Weight before cooking, pounds.
Shrinkage, pounds.
Plate waste, pounds.
Surplus, pounds.
Amount consumed, pounds.
Percentage of consumption.

We found that the percentages given in Table 8 represented the average percentage of meat consumption and shrinkage (including wastage). These percentages of consumption seem to be absurdly low; but when we consider the butchering waste, the large amounts of water and fat which are eliminated by the cooking, and the weight of the bones, fiber and gristle, which appears as plate waste, the figures assume more reasonable proportions.

TABLE 9.—FORM OF TABLE FOR COMPUTATION OF DAILY CALORIES AND FOOD WASTE *

Date									
Menu for Day	Pounds Eaten	Chemical Composition			Number of Pounds Eaten			Plate Waste	Space Used for Computing Number of Calories
		% P	% F	% C	P	F	C		
Column for various foods		Percentage not totaled			These four columns are totaled				
Total No. of pounds									

* Abbreviations: P, protein; F, fat; C, carbohydrate.

Method of procedure for computing number of calories in dietary:

Number of pounds of protein plus number of pounds of carbohydrate × 1,820 (number of calories in 1 pound of protein or carbohydrate) = total number of calories of protein and carbohydrate.

Number of pounds of fat × 4,080 (number of calories in 1 pound of fat) = total number of calories of fat.

Total number of calories of protein and carbohydrate plus total number of calories of fat = total calories consumed for day.

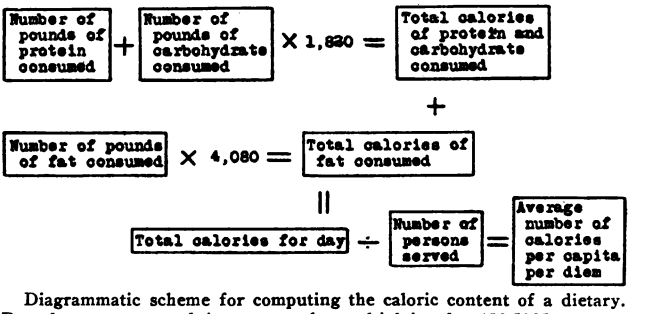
Total calories consumed for day ÷ number of persons served = average calories per patient per day.

Total pounds of plate waste ÷ number of persons served = average per capita plate waste per day.

ROUTINE FOR DETERMINING THE CALORIC VALUE OF FOOD

Our routine for determining the caloric value of the food served, which is similar to that in general use, except that we do not use the metric system, follows:

The various classes of foods are weighed separately before service. After the meal is finished all of the foods which are suitable for future use (such as meats on the platters, etc.), are weighed separately and the weights deducted from the original amounts. The foods which are left as "plate waste" are now separated out and placed in marked containers (one for each article), which are weighed individually. The original amount served minus the "left overs" minus the "plate waste" equals the actual amount of food consumed. It is, of course, necessary to determine the percentage of protein, fat and carbohydrate in each combination of foodstuffs served, and this is very easily accomplished as tables are available which cover almost every possible ingre-



Diagrammatic scheme for computing the caloric content of a dietary. Pounds are converted into grams by multiplying by 453.5925.

dient. The amount of protein, fat and carbohydrate is determined by multiplying the number of pounds of each foodstuff on the daily menu by its percentage of protein, fat and carbohydrate, and totaling the three separately. The total number of calories for the day is obtained by multiplying the number of pounds of protein and carbohydrate consumed by 1,820, as both of these have the same caloric value, and the number of pounds of fat by 4,080. The results are then added and the sum represents the number of calories consumed. The total number of calories, divided by the number of persons served for the day, gives the average number of calories consumed per person. Table 9 is used at Otisville for the computation of the daily calories and food waste. The calories are figured out for each meal and then totaled.

CONCLUSIONS

1. In all institutions for the care of the tuberculous, food studies, including the caloric content of the dietary and food waste, should be carried on at regular intervals, preferably for one week or more during the various seasons of the year, and these records should be made available for comparative purposes.

2. Special training, though advisable, is not a necessary requisite for the carrying out of a successful dietary study in an institution. It is, of course, essential that the doctor who directs the work should be thoroughly familiar with the problem. It is only necessary that the person or persons who are doing the work should be intelligent, careful and willing to follow conscientiously the "rules of the game."

3. The elimination of meats and eggs from the morning meal and the substitution of milk is a sound to indicate that rapid accumulation of weight is a characteristic of the female sex.

6. The avoidance of frequent repetition of foodstuffs is very important.

7. A four weeks' menu, when used as suggested, is of great aid to those controlling the dietary, and tends to do away with repetition.

8. The treatment of small children, in separate units, in institutions with adults, is both feasible and advantageous in that it results in economy of foodstuffs.

9. Small initial servings with as many "seconds" as may be desired is satisfactory to the patients and prevents much plate waste.

10. The plate waste in institutions for the tuberculous is of necessity higher than in hospitals for the insane or in general hospitals.

Much credit is due to Miss Marguerite Brady, who has been in charge of the dietary work at the male unit since the work was started, and to Miss Carlotta Nellis, Miss Beatrice Cummings and Mrs. Catherine Stoltzenberg, who served in turn as dietitians at the female unit. We wish to express our thanks to Dr. Herbert M. King for his assistance, to Professor Graham Lusk for reviewing the results of our work, and to Miss Charlotte Strickland of Loomis Sanatorium for many useful suggestions.

PUBLICATIONS

OF THE

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK

No. 1 Monthly Bulletin. Established in January, 1911. The Bulletin contains summary tables of vital statistics for the preceding month together with descriptive articles and notes intended for the instruction of the public and for the information of physicians and others concerned in public health work.

No. 2. Weekly Bulletin. This contains a weekly summary of vital statistics and brief public health news of current interest. At the present time, only a small edition of reprints is available for mailing to public health officials and others particularly interested.

No. 3. Monthly Drug Bulletin. A monthly publication which aims to enlist the cooperation of druggists in public health work by presenting to them an account of those activities of the Department of Health which pertain largely to their own work. This bulletin is mailed, without charge, to all drug stores in the city.

No. 4. School Health News. A monthly publication designed to secure the cooperation of schoolteachers in the work of the Department of Health. This publication is sent to each school, in quantity sufficient to supply each teacher with one copy. There is no mailing list for individual teachers.

No. 5. Neighborhood Health Chronicles. These are simply written popular leaflets published monthly for the purpose of instructing the masses in health matters. They are prepared in cooperation with local health agencies and are distributed directly into the homes. There is no mailing list.

No. 6. Staff News. A monthly publication for the instruction of employees of the Department of Health. It contains both news items and official notices and orders. This publication is distributed only to those connected with the Department of Health.

No. 7. Collected Studies from the Research Laboratory. An annual collection of scientific papers representing the work done at the bacteriological laboratories for the year.

No. 8. Monograph Series. A series of special papers by officials or employees of the Department, each dealing with some particular problem or phase of the Department's work. These papers appear from time to time, at no specified interval.

No. 9. Reprint Series. The Department occasionally reprints at its own expense and distributes shorter papers published by its officers or employees in medical and other scientific journals. Such papers are published in a standard serial form, with a list of those available for distribution.

No. 10. Tuberculosis Monographs. This consists of scientific papers dealing with various phases of tuberculosis. There is no regular mailing list, but the publication will be sent on request to those interested.

No. 11. Other Publications. The Department of Health also publishes numerous pamphlets of rules and regulations, methods of procedure, instructions and advice to public on particular subjects, etc., which are not classified or listed.